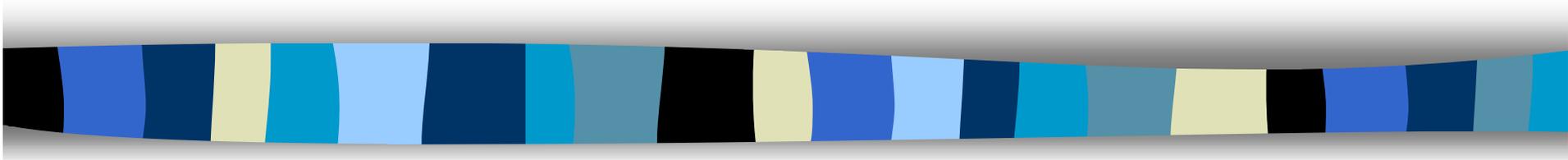
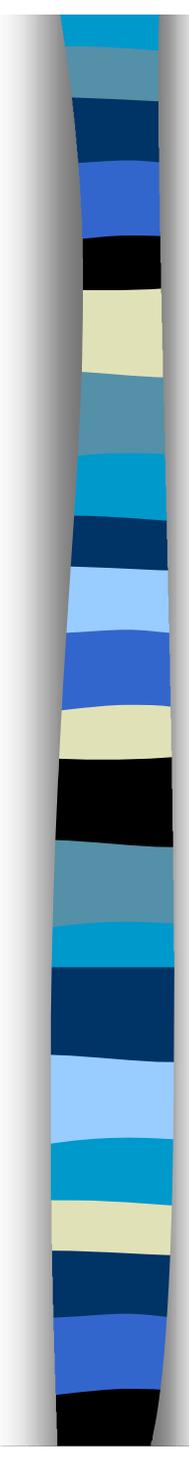


# ITS Standards - An Overview



HRI / ITS Standards Workshop  
**Richard Weiland**  
**Weiland Consulting**  
**July 22-23, 1999**



# Overview

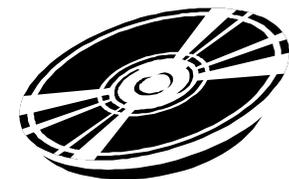
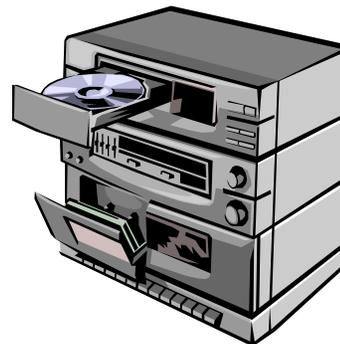
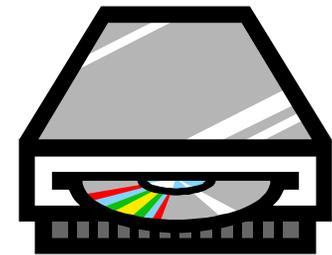
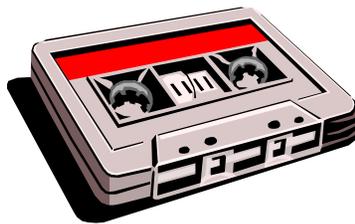
- Why standards are important
- Kinds of standards
- How standards are developed
- The ITS standards program: stakeholders and roles
- What we want to accomplish this week

# Why Standards Are Important



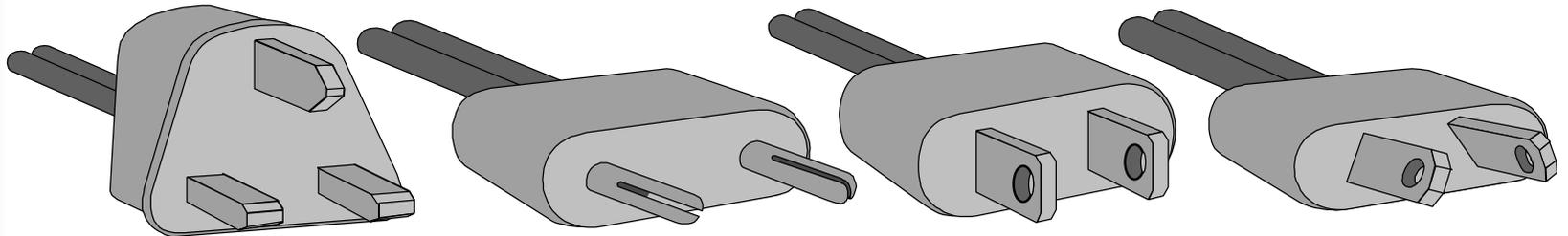
# Life Without Standards

- A different player for every recording



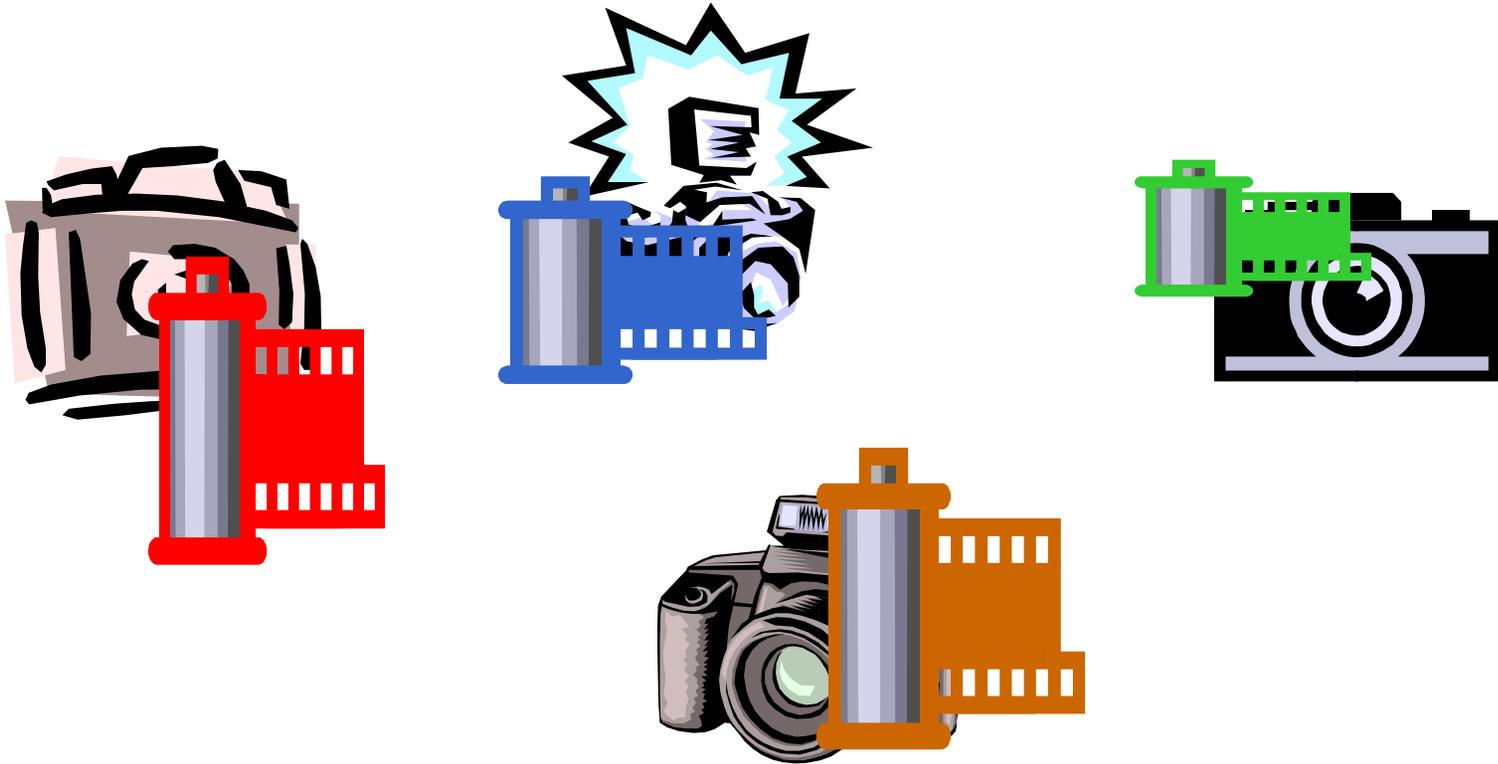
# Life Without Standards

- A different plug for every appliance



# Life Without Standards

- Different film for every camera



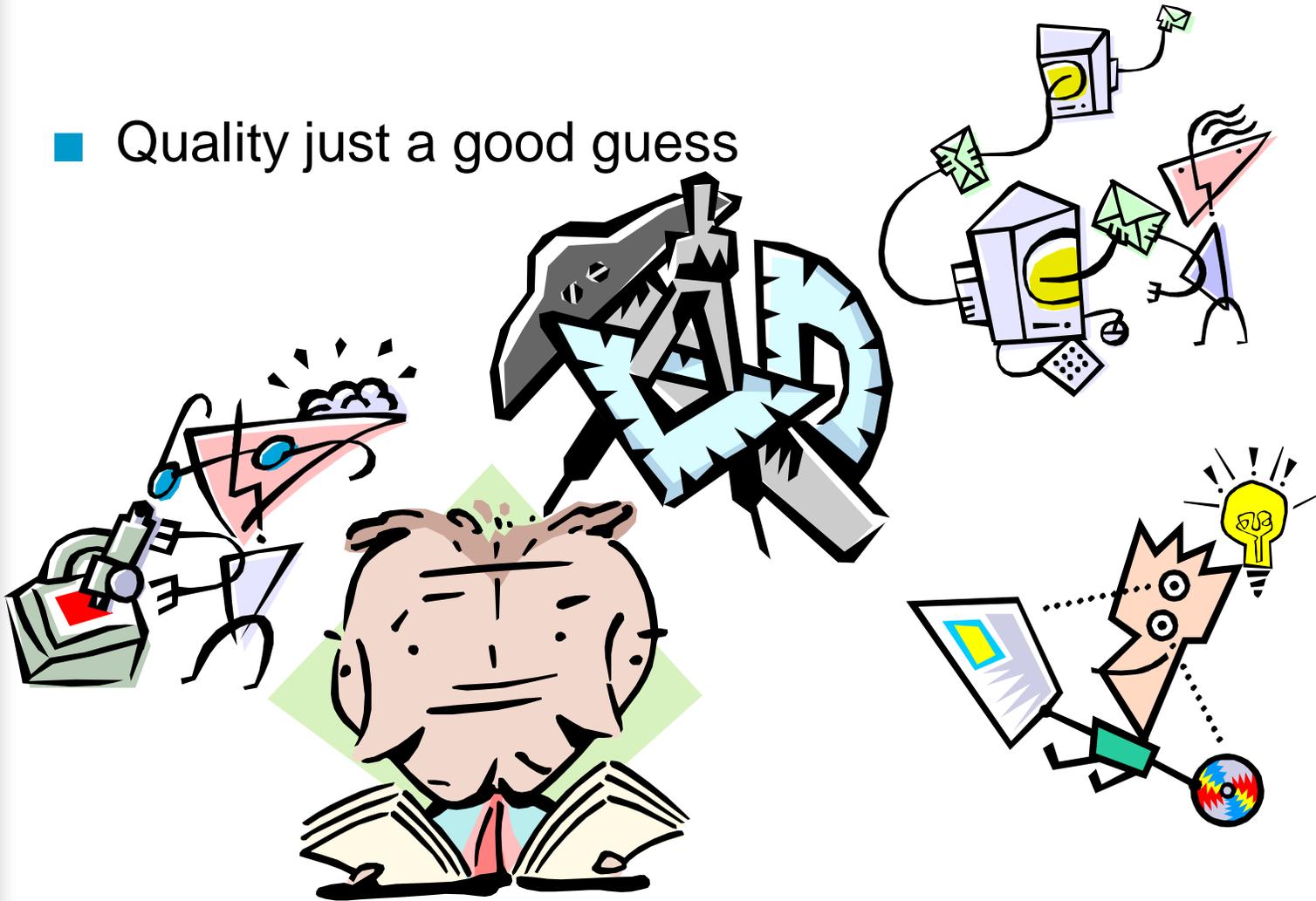
# Life Without Standards

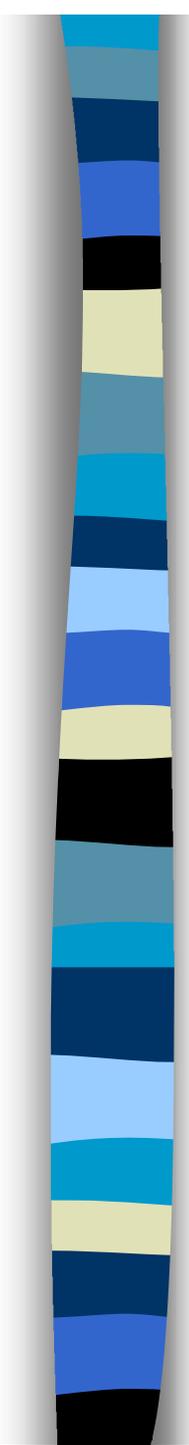
- Different traffic signs in each state



# Life Without Standards

- Quality just a good guess





# What Do Standards Accomplish?

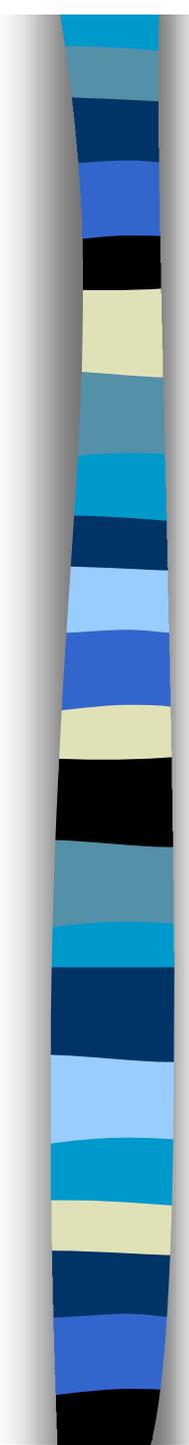
Compatibility and interoperability

+ Buyer and seller confidence

+ Producer investment and involvement

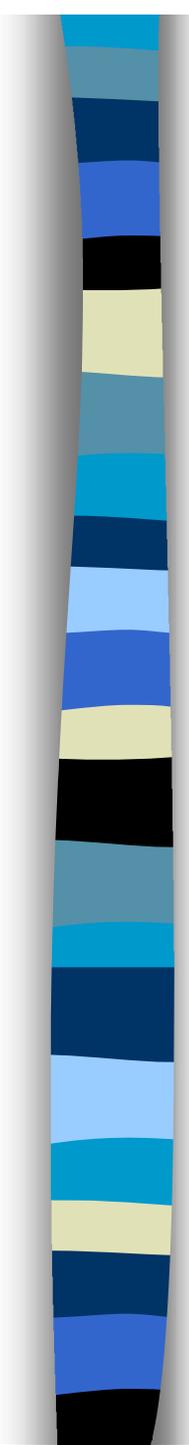
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**Industry growth**



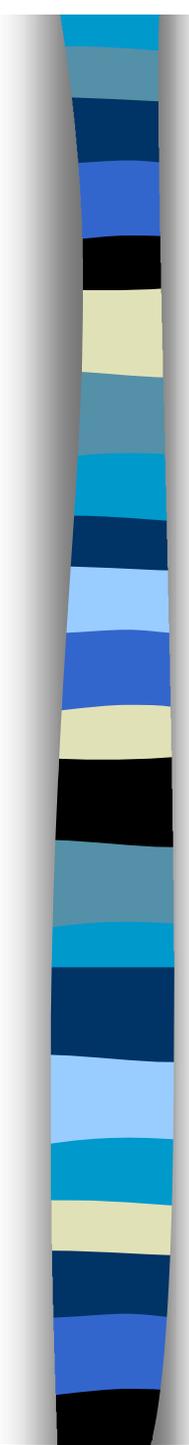
# Kinds of Standards - Three Cuts

- By level of prescriptiveness
- By function
- By development process



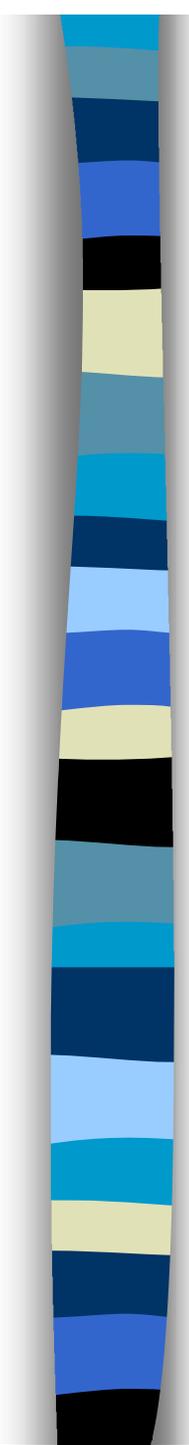
# By Level of Prescriptiveness

- **Standard**
  - Normative
- **Recommended Practice**
  - Advisory
- **Information Report**
  - Informative



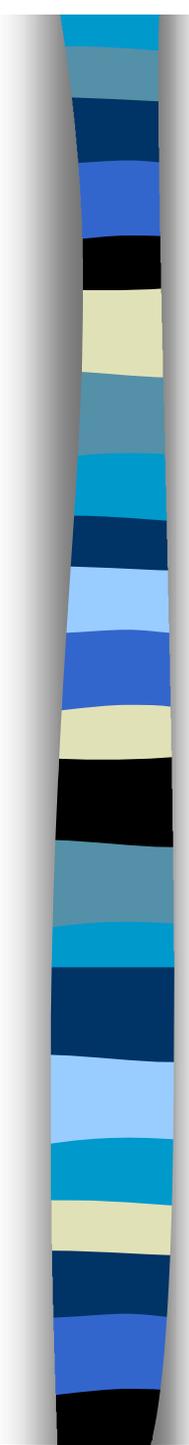
# By Function

- Design standards
- Interface standards
- Framework standards
- Performance standards
- Testing methods
- Terminology



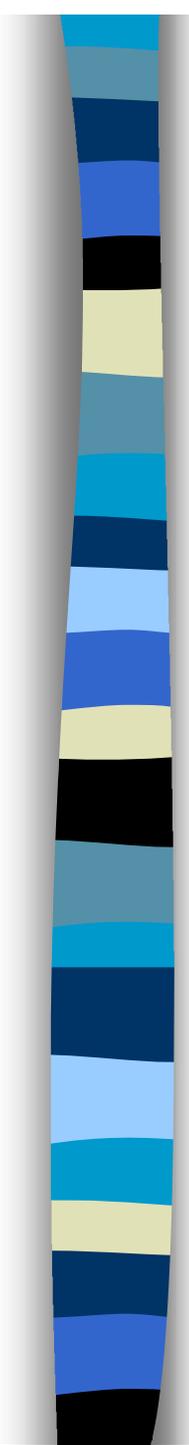
# Design Standards

- Where user consistency -- product structure or appearance -- is top priority, e.g.,
  - **Uniform Traffic Controls and Devices**
  - **P-R-N-D-2-1**
  - **1024 x 768 pixels**
  - **Zip codes**
- Still reasonable room for innovation



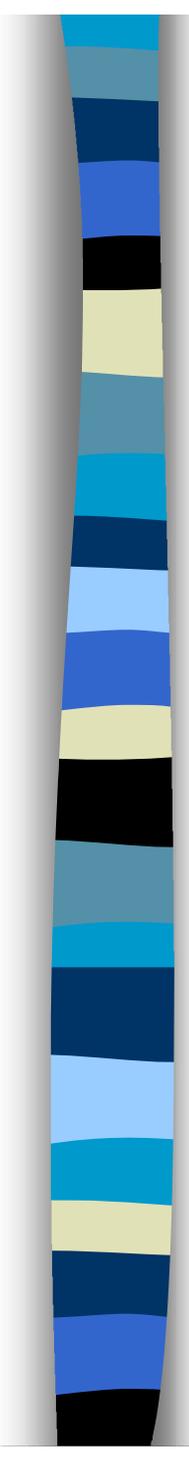
# Interface Standards

- Facilitates interconnection of components or adjoining systems
  - **Communications protocols**
  - **Message sets**
  - **Plug compatibility**
- Helps keep design issues separate



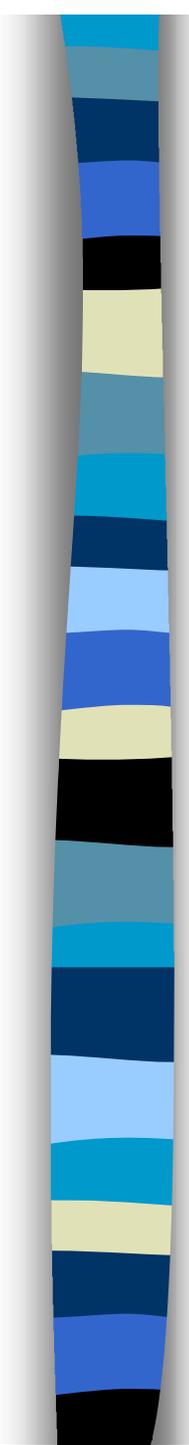
# Framework Standards

- Foundations for multiple products and services
  - **110 volts, 60 Hz**
  - **Metric system**
  - **Rail gauge**
  
  - **Location reference**
  - **Data dictionaries**
  - **Message templates**



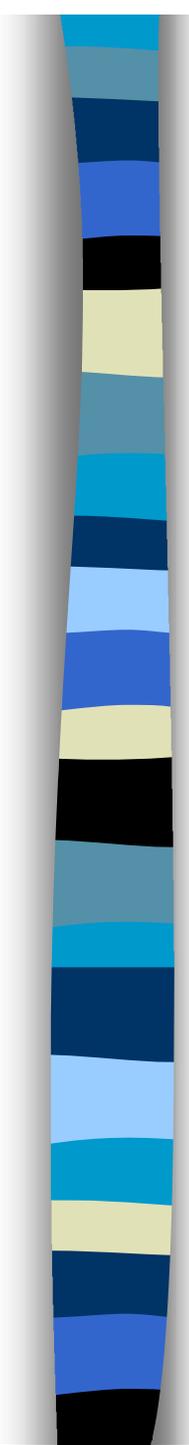
# Performance Standards

- Results oriented -  
**What product should accomplish or achieve, e.g.,**
  - **Braking distance**
  - **Miles per gallon**
  - **Emissions caps**
  - **Pavement service life**
- Doesn't specify *how* to do it
  - **Maximum room for innovative design**



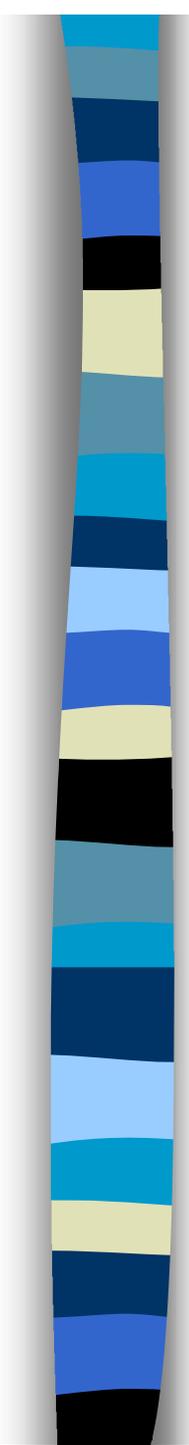
# Testing Methods

- Consistent, replicable methods for assuring quality and compliance:
  - **Crash tests**
  - **Stress tests**
  - **Content analysis**
  - **Diagnosis**



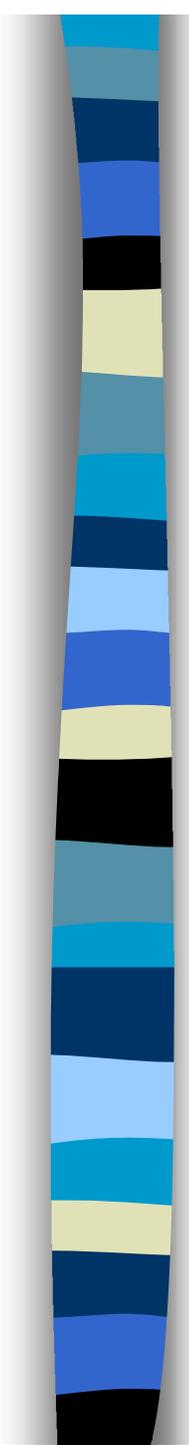
# Terminology

- Agreements on what words mean
  - **Accelerates contracting**
  - **Helps minimize confusion and conflict**
  - **e.g., “IEEE Standard Dictionary of Electrical and Electronics Terms” (IEEE 100-1996)**



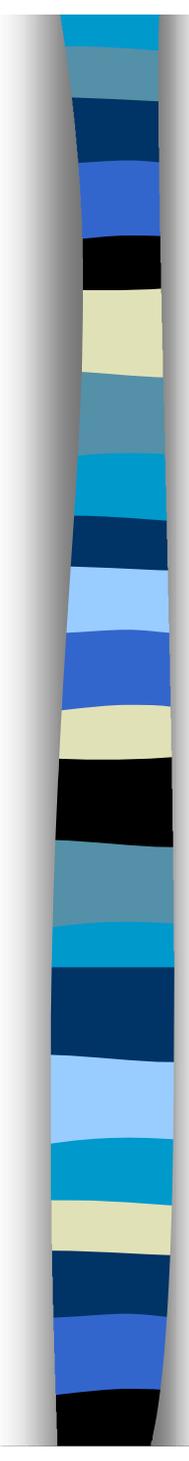
# By Development Process

- **De facto**
  - (e.g., CDs, MS Windows)
- **Regulatory**
  - (e.g., CAFÉ, MUTCDS)
- **Consensus**
  - (e.g., ITS Databus, ISO 9000)
- Where each kind is appropriate.
- How each arises



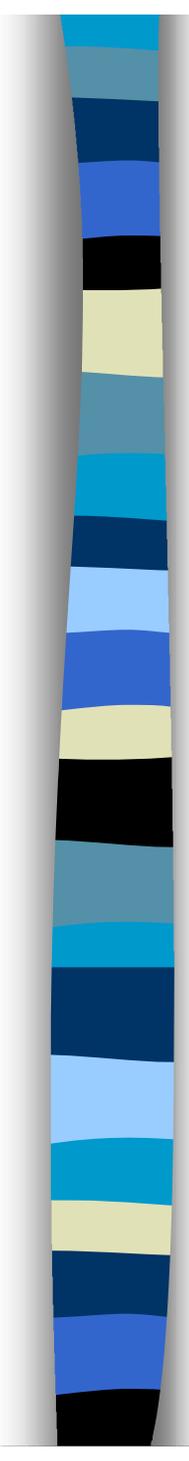
# De Facto Standards

- Arise from market forces:
  - **Dominance of one entrant (e.g., Microsoft), or**
  - **Agreement of market leaders (e.g., Philips/Sony for CD), or**
  - **Prolonged market struggle (e.g., VHS vs. Beta)**
- Most successful when dominant participants can “dictate” standards
- May initially favor dominant participants
- *But. . .* also help speed entry of smaller competitors especially when standards are *Open* not *Proprietary*.



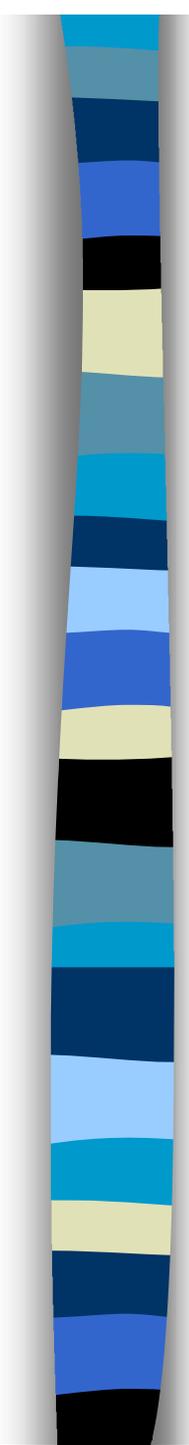
# Regulatory Standards

- Created and enforced by public agencies through rule-making
- Best for:
  - **Public safety and health**
    - (e.g., food handling, uniform signage)
  - **Fair allocation of scarce resources**
    - (e.g., spectrum)
  - **Situations where economics require system-wide action**
    - (e.g., emissions standards for automobiles)



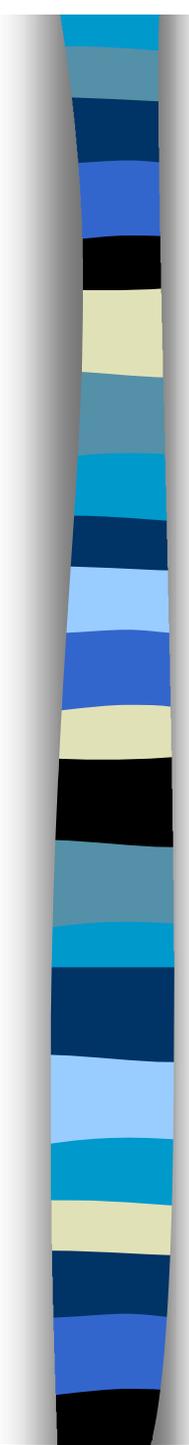
# Consensus Standards

- Voluntary agreements among:
  - **Technology vendors, buyers, and users**
  - **Government agencies at all levels**
  - **Advocacy groups, industry consultants, etc.**
- Via Standards Development Organizations (SDOs):
  - **Professional or industry associations (usually)**
  - **Accredited by American National Standards Institute (ANSI) (often)**



## ANSI Process . . .

- **Open** - No hidden smoke-filled rooms
- **Inclusive** - All interested parties able to participate
- **Characterized by due process** - Well-defined stages, with checkpoints
- **Consensus-based** - General agreement through cooperation and compromise

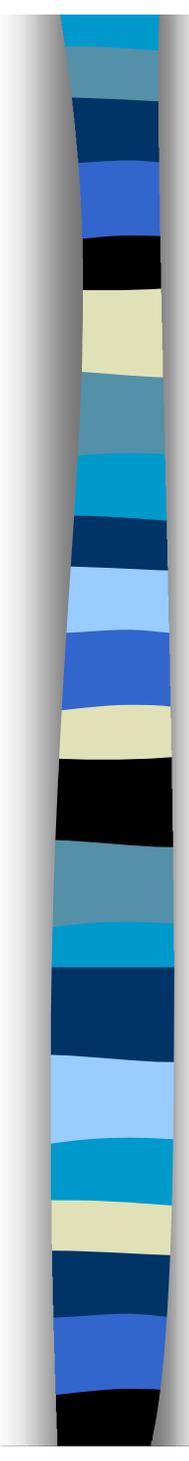


# Consensus Standards are *Hard!*

- Work is mainly volunteer effort
- Work is mainly political, not technical
  - **Harmonizing conflicting vested interests**
  - **Trust building needed**
  - **Pain must be equalized**

*But . . .*

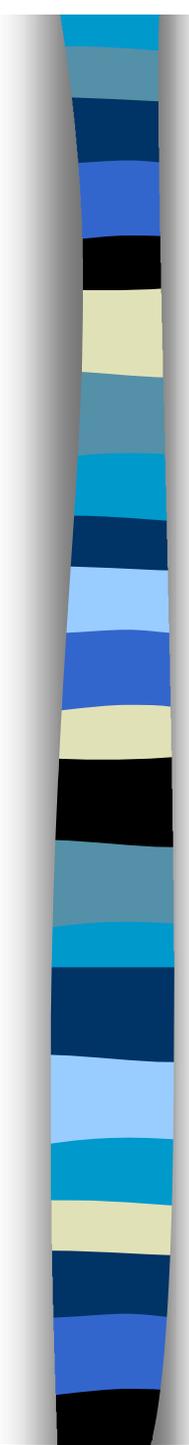
- Result is durable, well-accepted standards!



# Some Standards Development Organizations

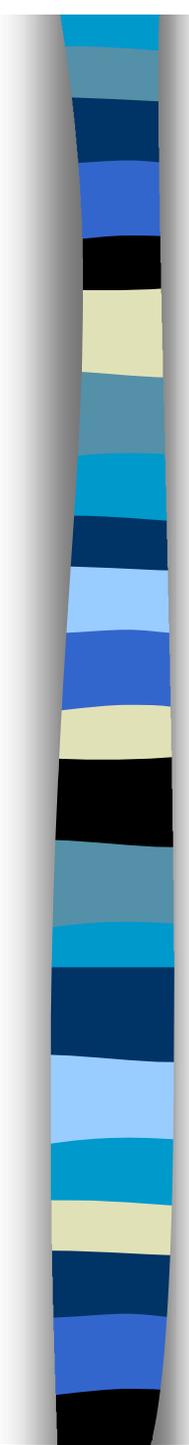
- Professional/Engineering Societies
  - **ASCE, ASME, IEEE\*, ITE\*, SAE\***
- Industry Associations
  - **AREMA, CEMA\*, NEMA\*, SIA\*, TIA**
- Standards-Specific Organizations
  - **ASTM\***
- Special Charters
  - **AASHTO\*, ANSI\*, NIST**

**\*Already active in ITS standards development**



# How Consensus Standards are Developed

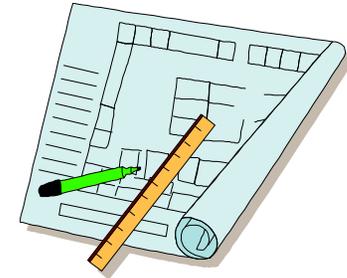
- Identification of Need
- Requirements Analysis
- Development
- Approval at Multiple Levels
- Acceptance and Use
- Maintenance or retirement



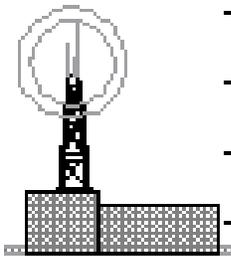
# The ITS standards program

- Impetus from industry
- Direction from Congress
  - **ISTEA and TEA-21 issues**
- National ITS Architecture
- Role of US DOT
- Role of ITS America

# Impetus from Industry



## ■ Strong interest from industry and public agencies:



- **Map database standards**
- **Electronic toll and traffic management (DSRC)**
- **FM subcarrier**
- **Vehicle Databases**
  - **Smart “smart bus” bus**
  - **ITS Databus**
- **Human factors & safety, especially in-vehicle**
- **Link traffic management centers with field equipment**
- **Commercial vehicle operations (CVISN)**
- **Traveler information services**





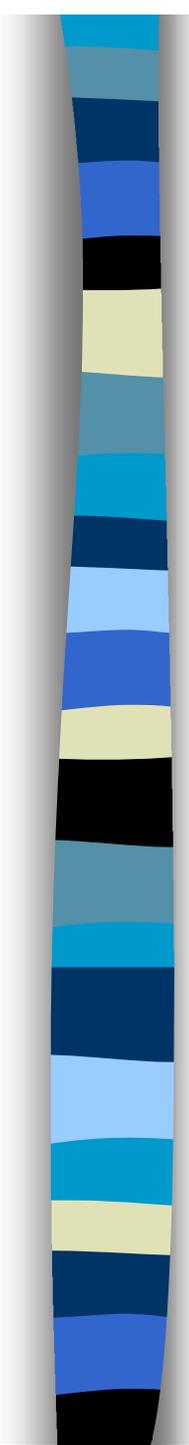
# Direction from Congress via ISTEA

- “The Secretary shall develop and implement standards and protocols to promote the widespread use and evaluation of [ITS] technology.”
- “Such standards and protocols shall promote compatibility among [ITS] technologies implemented throughout the States.”
- “The Secretary may use the services of such existing standards-setting organizations as the Secretary determines appropriate.”

# More Direction from Congress via TEA-21



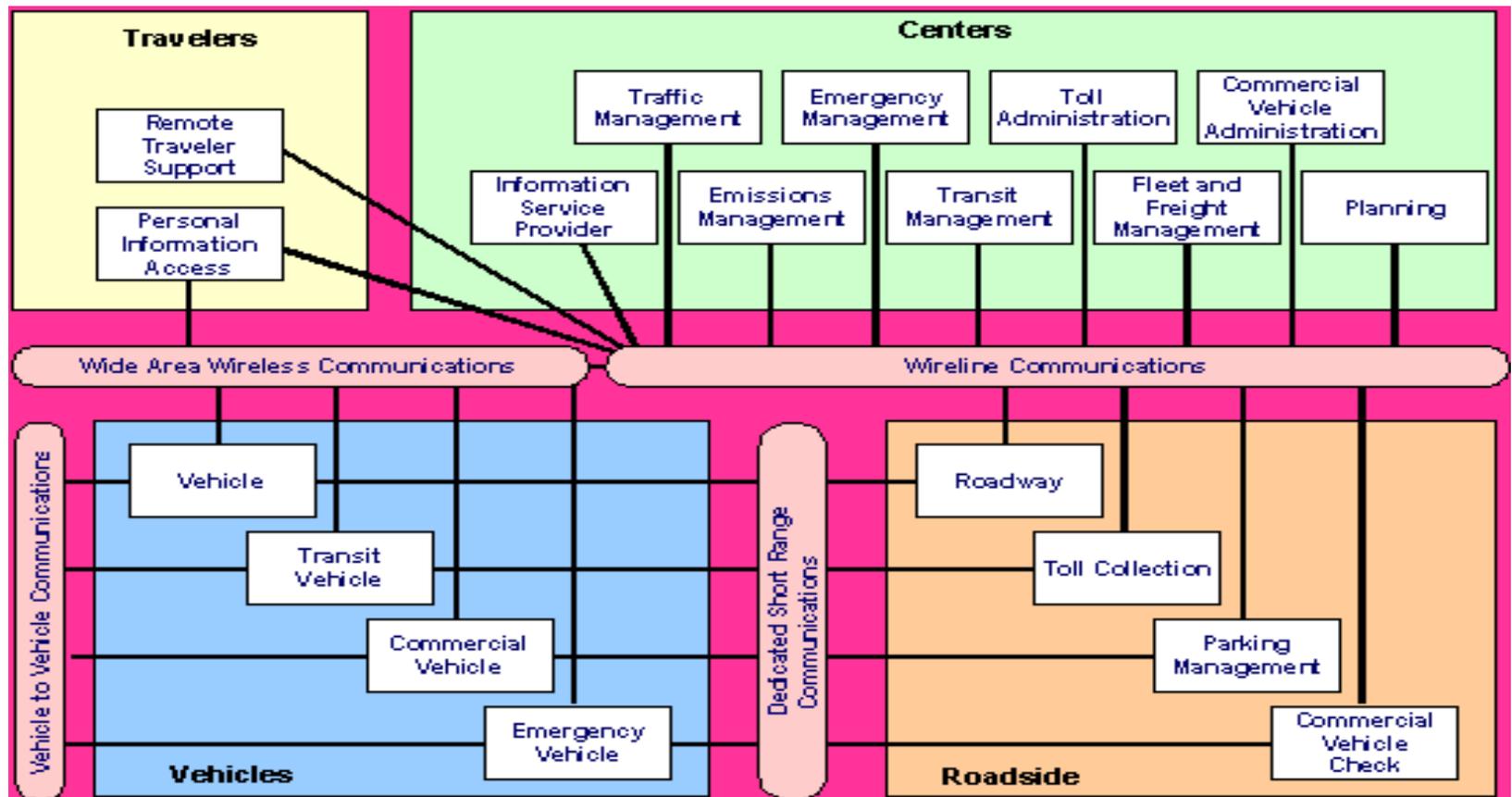
- “Continued investment in architecture and standards development ... is needed to accelerate the rate at which intelligent transportation systems are incorporated into the national surface transportation network, thereby improving transportation safety and efficiency...”
- “The Secretary shall ensure that [ITS] projects carried out using funds made available from the Highway Trust Fund, ... conform to the national architecture, applicable standards ... and protocols... .”

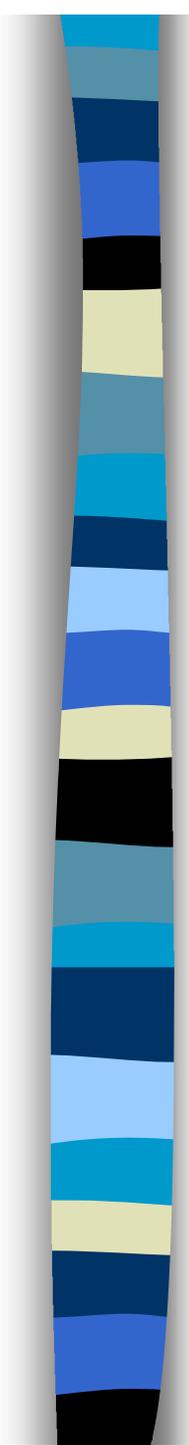


# National ITS Architecture

- An overall framework for ITS
- Focus on User Services (now 31 of them)
- Identifies major entities and flows
- Emphasis on interfaces, where:
  - **Pieces come together**
  - **Standards are needed**
  - **Interoperability is needed**

# Architecture “Sausage” Diagram

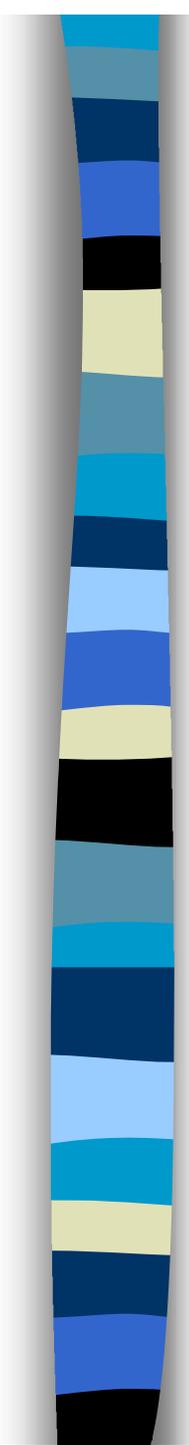




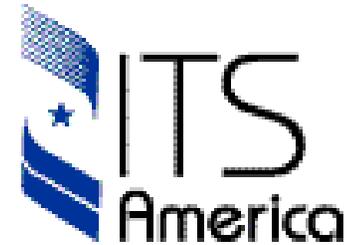
# Role of U.S. DOT



- Oversight, through Joint Program Office, of:
  - **Architecture**
  - **Standards**
  - **Modal and intermodal concerns**
  - **Model deployments and other field tests**
- Focused funding to accelerate the process
- Assuring safety and national interoperability
  - **Critical Standards**
  - **Conformance**

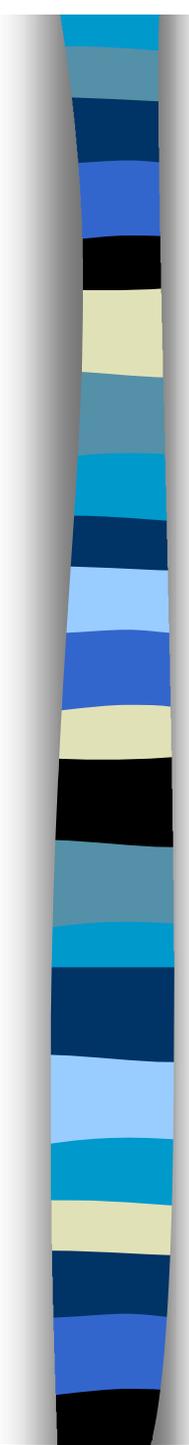


# Role of ITS America



*Public/Private Partnership to advance ITS, including standards-specific initiatives:*

- **Standards & Protocols Committee**
  - **Focus on community requirements for standards, engaging stakeholders in overall process**
- **Council of Standards Organizations**
  - **Forum for SDO cooperation and coordination**
- **Special Committees**
  - **Electronic Toll & Traffic Management Users Group**
  - **Critical Standards Advisory Group**
  - **U.S. Technical Advisory Group Admin. for ISO TC 204**



# What We Want to Accomplish

- Identify *standards* needed for sensible implementation of ITS at the HRI
- Identify the *organizations*, including SDOs, that should be involved
- Identify specific *people* who should participate